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| 10/694,030   | 10/28/2003  | Ji Yong Park         | 1514.1033                     | 3879             |
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| STEIN, MCEWEN & BUI, LLP<br>1400 EYE STREET, NW<br>SUITE 300<br>WASHINGTON, DC 20005 |             |                      | EXAMINER<br>LANDAU, MATTHEW C |                  |
|  |             |                      | ART UNIT<br>2815              | PAPER NUMBER     |

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/694,030

Applicant(s)

PARK ET AL.

Examiner

Matthew Landau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 5 and 8-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 7, 24, 25 and 27-29 is/are rejected.
- 7) ☒ Claim(s) 26 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

This application contains claims 5 and 8-23 drawn to an invention nonelected with traverse in the reply filed November 4, 2004. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

### ***Claim Objections***

Claims 1 and 24 are objected to because of the following informalities:

The limitation “wherein an area surrounded by the primary grain boundaries” is objected to. Since the claim previously defines “adjacent primary grain boundaries”, it appears that “the primary grain boundaries” refers to only those primary grain boundaries that are adjacent. In other words, it appears that the area is surrounded by only two primary grain boundaries. It is clear from the specification and drawings that more than two (four, for example) primary grain boundaries surround the area, and that out of those primary grain boundaries, the adjacent boundaries are not parallel. It is suggested Applicant amend the claims to adequately reflect this distinction. One possible alternative to the above limitation could be, “wherein an area surrounded by ~~the~~ primary grain boundaries”.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 4, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhang et al. (US Pat. 6, 451,638, hereinafter Zhang).

Regarding claim 1, Figures 1A-1C of Zhang discloses a polycrystalline thin film comprising adjacent primary grain boundaries 4 that are not parallel to each other, wherein an area surrounded by the primary grain boundaries is larger than  $1\mu\text{m}^2$ , and grains of polycrystalline silicon extend in a plurality of directions in the area from each of the primary grain boundaries. Note that the areas enclosed by the dotted line circles (region 3) shown in Figure 1C are polycrystalline silicon (col. 6, lines 62-65). Therefore, it is considered that Zhang discloses a polycrystalline thin film. Also note that it is considered that the primary grain boundaries are the boundaries indicated by numeral 4 in Figure 1B and circular edge of each growth region 3 (shown as a dotted line in Figure 1C). The circular edges can be considered primary grain boundaries because they mark the end of crystal growth. Zhang discloses nickel region 2 of Figure 1A is  $4\mu\text{m}^2$  (col. 6, lines 42-44), therefore the area surrounded by the primary grain boundaries must be larger than  $1\mu\text{m}^2$ . Furthermore, it is inherent that when using the crystal growth process disclosed by Zhang, crystal grains grow radially outward from the nickel seed/catalyst 2. This is evidence by the circular shape of the crystalline regions 3 shown in Figures 1B and 1C. Since the grains grow radially outward, it is also inherent that the grains

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extend in a plurality of directions in the area from each of the primary grain boundaries. Also note that the limitation “to be used in display devices” is merely a recitation of intended use that does not structurally distinguish the claimed invention over the prior art.

Regarding claim 2, Figures 1B and 1C of Zhang disclose the primary grain boundaries are formed in a closed curve shape.

Regarding claim 4, Figure 1B of Zhang discloses the primary grain boundaries are symmetrical to each other centering around a certain axis passing through the primary grain boundaries, the axis extending diagonally from the center portion 5 outward through the middle of the surrounded area.

Regarding claim 6, Figure 1C of Zhang discloses the thin film is part of a TFT (col. 7, lines 31-33).

Claims 1, 2, 3, and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamazaki et al. (US Pat. 6,528,820, hereinafter Yamazaki).

Regarding claim 1, Figures 1A-2E, 3, and 6 of Yamazaki discloses a polycrystalline thin film 208 comprising adjacent primary grain boundaries (visible in Figure 6) that are not parallel to each other, wherein an area surrounded by the primary grain boundaries is larger than  $1\mu\text{m}^2$ , and grains of polycrystalline silicon extend in a plurality of directions in the area from each of the primary grain boundaries (visible in Figure 6 and pictorially shown in Figure 3). Note that Figure 6 shows a reference length of 100  $\mu\text{m}$ . In view this, it is clear that the area surrounded by the primary grain boundaries is much larger than  $1\mu\text{m}^2$ . Also note that the limitation “to be used

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in display devices” is merely a recitation of intended use that does not structurally distinguish the claimed invention over the prior art.

Regarding claims 2 and 3, Figure 6 of Yamazaki discloses the primary grain boundaries of Yamazaki are in a closed polygonal (rectangular) shape.

Regarding claim 6, Figure 2E of Yamazaki discloses the thin film 208 is used in a TFT (col. 7, lines 18-23).

Claims 24, 25, 27, and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Oana et al. (US PGPub 2003/0071312, hereinafter Oana).

Regarding claim 24, Figures 3-5 of Oana disclose a polycrystalline silicon thin film comprising adjacent primary grain boundaries that are not parallel to each other, wherein an area surrounded by the primary grain boundaries (see attached marked-up version of Figure 5) is larger than  $1\mu\text{m}^2$ , and polycrystalline silicon grains extend to the primary grain boundaries from an amorphous silicon portion in the area. The attached marked-up version of Figure 5 is provided to clearly demonstrate what the Examiner considers to be the primary grain boundaries (darkened lines) and the area surround by those boundaries. As indicated in Figure 5 (along with Figure 3), the crystal grains grow radially outward from the non-crystallized portions. Oana discloses the starting material for the semiconductor film is amorphous silicon (paragraph [0026]). Therefore, any region that has not been crystallized is amorphous. Note that the area indicated in attached Figure 5 shows that a non-crystallized (amorphous) region is in the center. Although Oana repeatedly uses the terminology “single-crystalline” to describe the obtained semiconductor film, the film still has a plurality of crystal grains (albeit, larger grains).

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Therefore, the film is, by definition, polycrystalline. As can be seen from Figure 6, each side of the crystal grains (the primary grain boundaries) has a length of  $2\ \mu\text{m}$ . Therefore, the area surrounded by the primary grain boundaries must be larger than  $1\ \mu\text{m}^2$ .

Regarding claim 25, the attached marked-up version of Figure 5 shows the primary grain boundaries are formed in a closed polygonal shape.

Regarding claim 27, the attached marked-up version of Figure 5 shows the primary grain boundaries are symmetrical to each other centering around a vertical axis that passes through the middle of the area.

Regarding 28, Figure 6 of Oana discloses the film is used in a TFT.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 102(e) as anticipated by Zhang or, in the alternative, under 35 U.S.C. 103(a) as obvious over Akimoto et al. (US PGPub 2003/0197666, hereinafter Akimoto) in view of Zhang.

It is unclear if the limitation “used in an organic electroluminescent display device” is a recitation of intended use or if the limitation positively claims a display device. Using the broadest reasonable interpretation, it is considered the limitation “is used in an organic electroluminescent display device” is merely a recitation of an intended use of the claimed thin

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film transistor. The TFT of Zhang (col. 7, lines 31-33) is capable of being used in an electroluminescent device therefore the claim is anticipated. Assuming, *arguendo*, that the organic electroluminescent display device is positively claimed and must be present in order to have anticipation, the claim would still be obvious over Akimoto in view of Zhang. Figure 1 of Akimoto discloses an electroluminescent device comprising a TFT with a polycrystalline silicon thin film active layer (page 3, paragraph [0037]). Zhang discloses a TFT with the properties of claim 1 (see above). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify Akimoto by using the TFT of Zhang for the purpose of using TFT having a semiconductor layer that can be crystallized at a relatively low temperature (see abstract of Zhang).

Claim 7 is rejected under 35 U.S.C. 102(e) as anticipated by Yamazaki or, in the alternative, under 35 U.S.C. 103(a) as obvious over Akimoto et al. (US PGPub 2003/0197666, hereinafter Akimoto) in view of Yamazaki.

It is unclear if the limitation “used in an organic electroluminescent display device” is a recitation of intended use or if the limitation positively claims a display device. Using the broadest reasonable interpretation, it is considered the limitation “is used in an organic electroluminescent display device” is merely a recitation of an intended use of the claimed thin film transistor. The TFT of Yamazaki (Figure 2E) is capable of being used in an organic electroluminescent device therefore the claim is anticipated. Assuming, *arguendo*, that the organic electroluminescent display device is positively claimed and must be present in order to have anticipation, the claim would still be obvious over Akimoto in view of Yamazaki. Figure 1



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of Akimoto discloses an electroluminescent device comprising a TFT with a polycrystalline silicon thin film active layer (page 3, paragraph [0037]). Yamazaki discloses a TFT with the properties of claim 1 (see above). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify Akimoto by using the TFT of Yamazaki for the purpose of using TFT having excellent characteristics (see abstract of Yamazaki).

Claim 29 is rejected under 35 U.S.C. 102(e) as anticipated by Zhang or, in the alternative, under 35 U.S.C. 103(a) as obvious over Akimoto et al. (US PGPub 2003/0197666, hereinafter Akimoto) in view of Oana.

It is unclear if the limitation “used in an organic electroluminescent display device” is a recitation of intended use or if the limitation positively claims a display device. Using the broadest reasonable interpretation, it is considered the limitation “is used in an organic electroluminescent display device” is merely a recitation of an intended use of the claimed thin film transistor. The TFT of Oana (Figure 6) is capable of being used in an electroluminescent device therefore the claim is anticipated. Assuming, *arguendo*, that the organic electroluminescent display device is positively claimed and must be present in order to have anticipation, the claim would still be obvious over Akimoto in view of Oana. Figure 1 of Akimoto discloses an electroluminescent device comprising a TFT with a polycrystalline silicon thin film active layer (page 3, paragraph [0037]). Oana discloses a TFT with the properties of claim 1 (see above). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify Akimoto by using the TFT of Oana for the purpose

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of using TFT having reduced variety of threshold value and stable operating characteristics (paragraph [0011] of Oana).

***Allowable Subject Matter***

Claim 26 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record, either singularly or in combination, does not disclose or suggest the combination of limitations including the primary grain boundaries are formed in a rectangular shape or a hexagonal shape.

***Response to Arguments***

Applicant's arguments with respect to the amended claims have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after

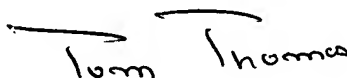
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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should any questions arise regarding access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TOM THOMAS  
SUPERVISORY PATENT EXAMINER

Matthew C. Landau

October 26, 2005

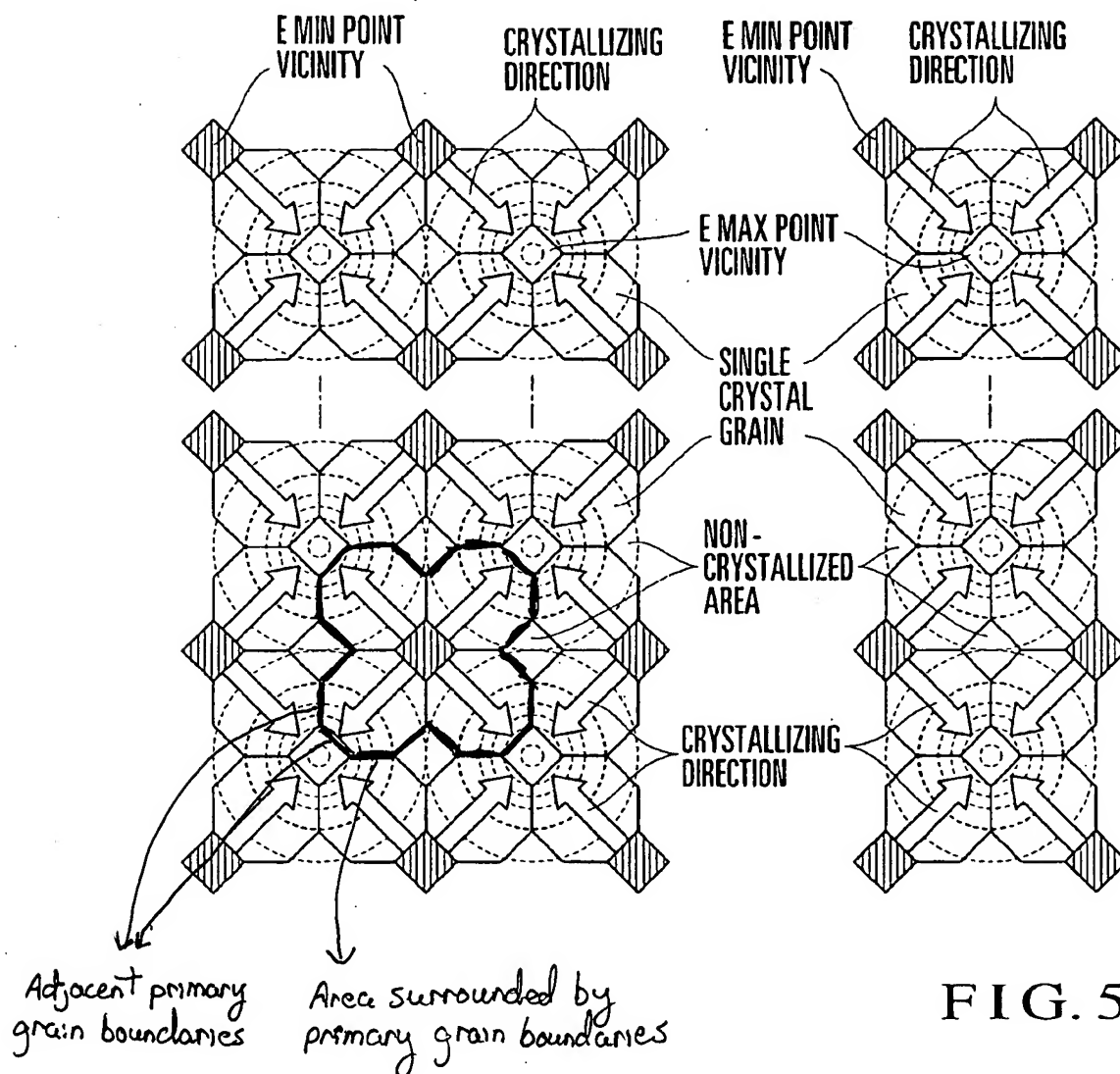


FIG. 5